

CALOUNDRA SIELLS.

By TOM IREDALE.

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Plate xlv.

Everyone who visits Caloundra collects shells. The beaches are strewn with large Cassids and Cockles of attractive appearance, intermingled with which many larger and smaller shells occur. In the rock crevices about highwater mark multitudes of still smaller shells are jumbled together, washed backwards and forwards by the tides so that a shelly débris rich in perfect specimens is available for searching. Where then is this El Dorado of the shell collector?

It really merits this appellation, as every visit reveals some golden treasure, some specimen of rarer beauty than hitherto, perchance a wanderer from the Tropics, or even some previously unknown molluscan gem.

Caloundra lies at the north end of Moreton Bay, some sixty miles from Brisbane, but the railroad from that place goes inland so that the nearest railway station is some thirteen miles distant from the beach. This comparative inaccessibility keeps it still remote, so that to-day it is little more visited than twenty years ago, a few motorists being the additional pleasure seekers. As a consequence shells are still plentiful, though at many beaches on the east Australian coast surf bathing has driven away the majority of the large species of molluses.

The locality is not unknown to the scientific world, as Queensland naturalists have found it a favoured spot, especially as fishing is excellent in the neighbourhood.

At the end of 1902, Mr. (now Dr.) H. L. Kesteven visited Caloundra in the interests of Mr. Hedley, and the collection made was presented by the latter to the Australian Museum. No list was published, though one was made, a copy of which I have before me, cataloguing no fewer than 373 species. This number well indicates the richness of the locality. Dr. Shirley with parties visited there, and a few species were recorded thence by him.

In February, 1909, I exploited the locality for Loricates, also making a general collection in the few days available. I was extremely impressed, and recorded the Loricata fauna (Proc. Malac. Soc. (Lond.) Vol. ix., June, 1910, 156-7) suggesting that it was of purely Peronian basic origin, contrasting with that observed at Port Curtis a few days previously which was just as surely Solanderian. A few years later Dr. T. Harvey Johnston made a study of the littoral fauna from the ecological viewpoint, contributing an important paper entitled "Ecological Notes on the Littoral Fauna and Flora of Caloundra, Queensland" to the Queensland Naturalist (Vol. ii., April, 1917, 53-63). In that paper the general nature of the beaches and rocks are detailed, together with a preliminary account of the organisms living between tide marks.

Mr. A. F. Basset Hull, my collaborator in the Monograph of the Loricates now appearing in this Journal, visited Caloundra in 1921 and 1922, and confirmed my conclusion as to its wealth in this group.

Otherwise Mr. George Gross, of Brisbane, a very enthusiastic conchologist, had long collected in the locality, but this worker never published anything, although his collection, which I had the pleasure of examining in 1909, and which passed into the possession of Sir Joseph Verco, of Adelaide, South Australia, was probably the most extensive yet made of south Queensland mollusca.

Last year, on returning with Mr. G. P. Whitley from Michaelmas Cay, off Cairns, North Queensland, circumstances necessitated a couple of days interval, which comparatively might have been wasted in Brisbane. Instead we decided to run down to Caloundra and review the outlook again. Although the weather was unpropitious we were well rewarded for our pains, as we secured some nice things, while the place justified all encomiums after our experience on the Great Barrier Reef. We met there an ardent shell collector, Mr. C. H. Nicholson, who has since handed us some interesting specimens.

Miss Joyce K. Allan, of the Australian Museum, has painted the beautiful figures here presented, and which almost make verbal descriptions unnecessary. My thanks are sincerely given here, as they make the recognition of my records easy to everyone.

The types of the new species here described are in the Australian Museum.

ANADARA NICHOLSONI, n.sp.

Plate xlvi., figs. 6, 13.

Although Arks have been recorded with world-wide distribution, this conclusion does not harmonise with the data provided by series from many localities. A few species do appear to have a wide range, but closer examination reveals separative characters of good value, and these are usually associated with geographical limits.

The species hereunder described recalls *A. pilula* Reeve, from which it is separated by its larger size, much greater solidity, and its hinge teeth.

Shell medium, very solid, rather orbicular, oblique, obese, umboes rather distant, lozenge area pronounced, hinge teeth comparatively few and strong. Color of dead shell white. Sculpture consisting of twenty-five strong radial ribs with deep interstices, the ribs closely nodulose, the interstices faintly striate, concentrically with growth lines. The hinge-line is short, the median hiatus ill marked; on one side about twenty teeth, including half a dozen large irregular ones at the end; on the other side about twelve teeth with four large somewhat angulate teeth at the end.

Length, 33 mm.; height, 39 mm.

A dead shell collected by Mr. C. H. Nicholson at Caloundra.

The hinge-line of *A. pilula* Reeve is here figured from a specimen from Yeppoon, Queensland. (Plate xlvi., fig. 14).

ANADARA THACKWAYI, n.sp.

Plate xlvi., figs. 4, 5.

While on the subject of Arks, I take this opportunity of describing a strange New South Wales species first found by Mr. A. E. J. Thackway, for whom it is named. The first specimens were picked up on the beaches between Port Jackson Heads and Port Hacking, one valve at Cronulla the other at Maroubra. During the last four years Mr. G. P. Whitley has found five more valves at long intervals on the Maroubra beach, while I have searched continuously in vain the beaches north of the Port Jackson Heads, though, as the species is a relative of the northern tropical *A. granosa*, it would be expected there first.

The new species agrees with *granosa* in general features, but is easily separated by the distant nodulation of the ribs, smaller size, finer hinge-teeth, and approximation of the beaks. Shell suborbicular or semioval, deep, regularly ribbed, beaks oblique, a little excentric, approximating, lozenge area narrow.

Color of dead shells cream to chalk. Sculpture consisting of about twenty-one elevated distant ribs, each bearing about seven to nine prominent nodules, the earlier ones becoming obsolete: the deep wide interstices finely striate. The hinge-line shows fine longitudinal teeth, scarcely larger at the ends, but with a distinct hiatus in the middle below the beaks, where a couple of larger oblique teeth occur; on one side twenty-five teeth can be counted, on the other fifteen only: in the tropical *granosa* thirty and twenty teeth respectively occur.

Length, 26 mm.; height, 18 mm.

A strange aberration, more elongate and with more and closer nodulation also occurred, and is here figured. Length, 30 mm.; height, 24 mm.

STREPTOPINNA SACCATA INUSITATA, n. subsp.

Plate xlvi., figs. 9, 10, 11.

An extraordinary mollusc, suggesting a cross between an *Avicula* and a *Pinna*, was found at Michaelmas Cay, North Queensland, and immediately recognised by Mr. Hedley as a form of *Pinna saccata* L., a species previously unrecorded from Australia. A couple of larger specimens were later secured, but to our great surprise a larger valve was found at Caloundra. This showed the muscle scars to be very small, and is here figured. These scars approximate much more closely to those of *Atrina* than to those of *Pinna*, and obviously indicate the species as generically distinct.

When Martens reviewed the Pinnas (Ann. Mag. Nat. Hist. (3) xvii., February, 1866, 81-88) he noted the distinction of the species, and suggested habits, but gave the group no name. Without further information he introduced *Streptopinna* (Beitrag meeresf. Mauritius (Möbius), 1880, 318) some years later for this species alone.

Apparently this species lives among corals and has adopted strange shapes to get around the branches, as when it has struck easy ground it grows comparatively straight as the Caloundra one has done.

The Queensland form is easily separated from the type in its different colouration, pale horn instead of amber-red, its more regular sculpture, five flattened distinctly separated ribs being counted, a sixth and seventh occurring in aged shells, and noticeable smooth area.

PRATULUM PROBATUM, n.sp.

Plate xlvi., fig. 8.

Some years ago Hedley (Proc. Linn. Soc. N.S.W., 1904, 195, May 10th) recorded *Cardium bechei* Reeve, from the Tweed Heads district, New South Wales, previously only known from Queensland in Australia. Many valves were present on the Caloundra beaches and they were found to disagree in shape and sculpture from the true *C. bechei*, and are therefore here differentiated. Shell large, thin, nearly orbicular, somewhat obese, medially and anteriorly very finely radiately rayed, almost smooth, posteriorly boldly closely ridged. Colouration rose-pink flecked with white: internally pure white. The hinge-teeth agree with those of the type of *Pratulum*, suggesting tropical origin for the group. The radials on the anterior portion are very numerous and fine and are crossed by similar concentric growth lines, almost imperceptible in the juvenile, but odd ones are marked as growth stops: these become more pronounced with age, so that an old senile shell may show a series of step-like stages. Moreover, the periostracum is laid down in accordance, and, if present, shows a beautiful concentric arrangement. The posterior radials also bear very pronounced prickles in the living shell, but apparently these are easily worn off as they

are seldom seen in the dead shells. These posterior radials number about twenty-seven and tooth the edge of the shell: though no noticeable radials persist on the medial and anterior portion of the shell: the edge is strongly and similarly closely toothed.

The figured shell is a small specimen from Trial Bay, New South Wales, measuring 30 mm. broad and 28 mm. high. A perfect specimen from the Percy Islands, Queensland, measures 46 mm. in breadth, 44 mm. in height, and the conjoined valves 36 mm. A huge valve from the Tweed River Heads, New South Wales, measures 78 mm. in height, and 81 mm. in breadth.

MARINAURIS MELCULUS, n.sp.

Plate xlvii., fig. 3.

Shell small, flattened, somewhat circular, spire a little elevated, closely related to *Haliotis brazieri* Angas, but easily separated by the presence of cording between the orifices and the basal rim. Colour pale greyish brown, flamed with brown and red. A fine radial sculpture crosses a close spiral sculpture of flattened lirae producing an obsolete reticulation which decreases with growth: a raised medial concentric rib is present.

The orifices are close together and upstanding, while between these and the peripheral ridge lie four concentric corded ribs; between the periphery and the callus four ridges occur, this area being convex. Columellar plate wide and flat. Internal colouration silvery: all whorls exposed.

Length, 33 mm.; breadth, 29 mm.

Broken specimens not uncommon at Caloundra.

Hedley (Proc. Linn. Soc. N.S.W., Vol. xxix., 1905, April 12, 1906, 521) observed that "It further seems to me that *H. rubicundus* Montfort, should replace the later *H. tricoloris* Lamarek. Montfort's name, which Pilsbry marked as very doubtful, was recognised and accepted by Dr. J. E. Gray, who had unusual facilities for ascertaining the facts of the case." This conclusion was revised (i.e., xxxiii., 1908, 464) on the grounds that *rubicundus* Montfort was preoccupied by Bolten and that *scalaris* Leach should be used. However, Montfort's *Padollus rubicundus* was the monotype of *Padollus*, and it appears to have been overlooked that Montfort described from Africa a small shell a little more than an inch at its greatest diameter, and the good description and figure are both inapplicable to the Australian shell. Further there lives in South Africa a shell which agrees in size and description with the Montfortian species, known as *Haliotis parva* Linn. Bolten's *H. rubicundus* (Mus. Bolt. (2), 1798, 14) was cited by Hanley as referable to the Linnean *parva*, so that *Padollus* must be restricted to the African species.

I therefore introduce *Marinauris* for the Australian form commonly regarded as *Padollus*, but would note that when Pilsbry monographed these molluscs (Man. Conch., Vol. xii., 1890) he placed *brazieri* in a section under *Padollus* while he located *roei*, of which he incorrectly made *hargravesi* a synonym, alongside *nucrosa* under *Haliotis*.

MARINAURIS ETHOLOGUS, n.sp.

Plate xlvii., fig. 1.

Shell small, flattened, somewhat circular, closely related to *H. hargravesi* Cox, but differing at sight in the more numerous cords in this respect recalling the West Australian *H. roei* Gray, than which it is smaller, more circular and with finer sculpture.

On the last whorl between the suture and the orifices seventeen ribs of unequal width; between the orifices and the periphery three similar ribs, and between the periphery and the silver callus six or seven minute elevated ridges occur. The preceding whorl shows nine main ribs or cords, the number increasing by intercalation: all the ribs are square-cut, the interstices deep, both ribs and interstices crossed by numerous closely packed very marked threads.

The interior silvery, clearly showing the preceding whorls. Between the orifices and the columellar callus, which is wide and flat, the area is convex and corded; above the peripheral ridge are three distinct pronounced corded ribs.

Length, 41 mm.; breadth, 31 mm.

Broken specimens rare at Caloundra.

H. hargravesi Cox is the rarest of Australian Haliotids, but is apparently widely distributed in deeper water from north of Sydney to Twofold Bay. *H. brazieri* Angus has the same distribution, but is much more common at certain localities, Mr. G. McAndrew having collected large series on the beach at Shell Harbour, N.S.W.

PHASIANELLA CALOUNDRA, n.sp.

Plate xlvii., fig. 12.

Shell small, elongate oval, spire acute, whorls slightly rounded, sutures distinct, whorls seven, imperforate.

Colour creamy brown, circled with brown lines which are dotted with white and longitudinally flamed with brown in zigzag fashion; numerous variations of this colour scheme occur. Apical whorls minute, flattened; shell entirely smooth, but a microscopic spiral striation can be discerned with a glass; aperture ovate, about half the length of the shell; columella reflected and callused, the callus crossing to the posterior angle of the aperture; outer lip thin, sharp. Operculum normal, white, with a faint yellowish tinge medially.

Length, 15 mm.; breadth, 9 mm.

Abundant at Caloundra.

Very like the southern *P. variegata* Lam., but different from the N.S.W. form.

NANNOCASSIS TORVA Iredale.

Plate xlvii., fig. 7.

Shell large for the genus, spire depressed, almost planate, apical whorls a little elevated, shell somewhat triangularly ovate, variced, mouth narrowed. Early whorls worn, five remaining ones distinguishable, the earliest of these showing sculpture worn and not definitely determinable, the next flattened with about twenty-two angulate nodules at periphery, an obscure varix apparently completing the whorl, revolving lirae becoming noticeable: these are better marked on the next whorl where two or three may be seen on the lower half, the nodules also being better marked as riblets, while two varices may be observed: on the antepenultimate whorl the same sculpture becomes bolder and a varix is marked at three-fourths the length of the whorl. On the last whorl the periphery is angulate, seminodulose, the flattened shoulder bearing slanting radials, the spirals having become obsolete: below the shoulder is a slight depression followed by another seminodulose ridge and thence to the base longitudinal ridges to the number of about thirty occur between the preceding varix, three-quarters of a whorl back and the outer lip: fairly strong spirals, twenty-five to thirty in number, lattice the ridges: this sculpture is much emphasised on the face of the body whorl where it is heightened by a clear glaze from the

inner lip. The inner lip is closely and strongly wrinkled, the ridges running backwards on the upper half and forwards on the anterior portion. The canal is short, recurved, and bounded posteriorly by a very deep narrow gutter running into the umbilical sector which is closed by the varix and the reflection of the inner lip anteriorly: above the gutter is a rounded collar succeeded by a narrow sulcus. The deep gutter continues interiorly under the glaze as in *Nannocassis nana* T. Wds., while at the posterior end of the inner lip appears a well marked ridge forming with the outer lip a posterior canal recalling that of *Cypraecassis*. The outer lip is reflected and the varix flattened, medially spreading internally: strong distant ridges are present along the interior edge, about thirteen in number with five intercalating in the middle but not entering the mouth.

Length, 67 mm.; breadth, 38 mm.

This distinct species based upon a dead shell collected by Mr. C. H. Nicholson is easily separated from *N. nana* T. Wds. by its larger size and complex sculpture.

This makes the eleventh species of Cassid found on the beach at Caloundra, a number probably unsurpassed on any other beach in the world.

The present species was diagnosed but not fully described nor figured in "A Review of Australian Helmet Shells," published in the Records Austr. Mus., Vol. xv., 1927, 329.

AMORIA GROSSI, n.sp.

Plate xlvii., fig. 2.

Shell large, oblong oval, spire short, acuminate, smooth. Colour of dead shell pale cream, mottled and streaked with pale brown, the mottling forming two irregular interrupted bands. The spire is about half the length of the aperture.

The columella has four oblique plaits with a noticeable nodule at the posterior end, from some angles looking like a fifth plait. Interior of aperture white with about a dozen lines internally.

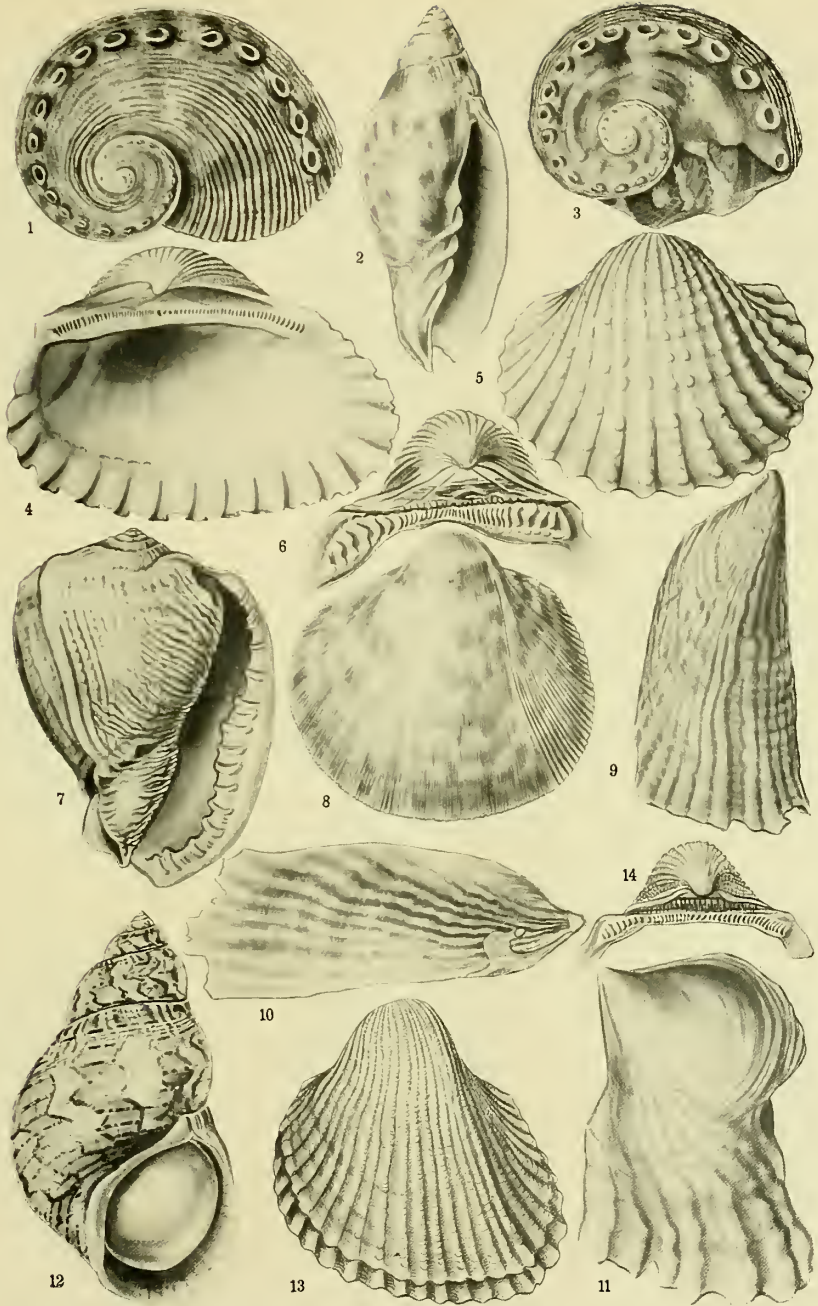
Length, 118 mm.; breadth, 48 mm.

Collected at Caloundra by Mr. G. Gross.

This specimen was named as new and the above name attached in MS. by Mr. Hedley, and is now published. The species differs in size and solidity, as well as colouration from any other of the *volva* group.

EXPLANATION OF PLATE.

- Fig. 1. *Marinauris ethologus* Iredale, type.
 2. *Amoria grossi* Iredale, type.
 3. *Marinauris melcerlus* Iredale, type.
 4. *Anadara thackwayi* Iredale.
 5. *Anadara thackwayi* Iredale, type.
 6. Hinge of *Anadara nicholsoni* Iredale, type.
 7. *Nannocassis torva* Iredale, type.
 8. *Pratulum probatum* Iredale, type.
 9. *Streptopinna saccata inusitata* Iredale.
 10. *Streptopinna saccata inusitata* Iredale, from Caloundra.
 11. *Streptopinna saccata inusitata* Iredale, from Caloundra.
 12. *Phasianella caloundra* Iredale, type.
 13. *Anadara nicholsoni* Iredale, type.
 14. Hinge line of *A. pilula* Reeve, from Yeppoon, Queensland.



Drawn by Joyce K. Allan.

CALOUNDRAS SHELLS.